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PD Pulse Current Characteristics at PDIV Level of Mineral Oil

Abstracts

The aim of this paper is to describe the partial discharge (PD) pulse current characteristics of the mineral oil at the partial discharge inception voltage (PDIV) level. This paper represents the experimental investigation of the PD pulse current characteristics of the mineral oil with the water content about 4 ppm at the PDIV levels tested by various tip radii of needle – plane electrode arrangements. The tungsten needle electrodes with the tip radius of 10 μ m, 20 μ m, and 40 μ m respectively were used as the high voltage electrode while the brass plane electrode with 75 mm diameter was connected to the ground via the shunt resistor of 50 ohm. The gap distance of the electrode system was set up at 50 mm. Two PDIV test methods were performed to investigate PDIV of the mineral oil. The first PDIV test method was experimented in accordance with IEC 61294. Then, the second PDIV test method so called combine test method was carried out. After that, the PD pulse currents of the mineral oil were measured at the PDIV level obtained from both PDIV test methods by the shunt resistor of 50 ohm and recorded by a high bandwidth oscilloscope. The PD pulse current parameters such as, pulse amplitude, pulse duration, rise time, pulse power and energy including the dominant frequency were analyzed. Furthermore, the inception electric field stress needed to generate PDIV of each electrode system was calculated. From the test result, it was found that the PD pulse amplitude, pulse duration, pulse power and pulse energy quite clearly depended on the needle tip radius, PDIV level and PDIV test methods. The smaller tip radius needle provided lower PD pulse current amplitude, lower pulse power and energy and narrower pulse duration. However, the smaller tip radius needle needed the higher inception electric field stress to generate PDIV.

More Informations :

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